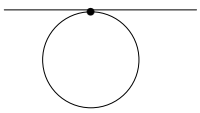
Math 1312
Section 6.2
More Angle Measures in Circle

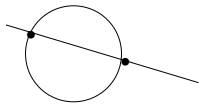
Definitions:

A **tangent** is a line that intersects a circle at exactly one point (**point of contact** or **point of tangency**).

A **secant** is a line (or a segment or ray) that intersects a circle at exactly two points.

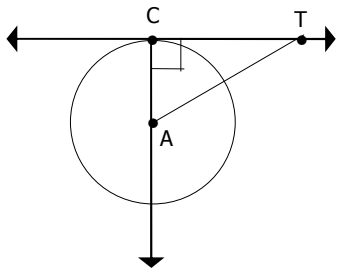
Example 1:





Theorem 1:
The radius drawn to a tangent at the point of tangency is perpendicular to the tangent at that point.

Example 2:

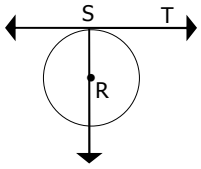


Note: Because $\angle TCA$ is a right angle then ΔTCA is a right triangle. Therefore, you could use the Pythagorean theorem to find the measure of a missing side.

Theorem 2 (converse of Theorem 1)**:**

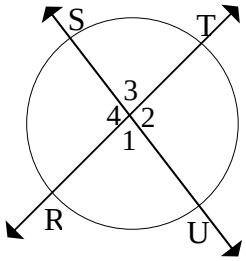
If a line is perpendicular to a radius then the line is a tangent of the circle.

Example 3:



Theorem 3:
The measure of an angle formed by two chords (two secants) that intersect within a circle is one-half the sum of the measures of the arcs intercepted by the angle and its vertical angle.

Example 4:



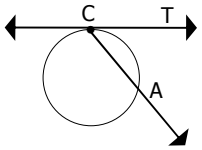
$m\angle 1 = m\angle 3$ and $m\angle 2 = m\angle 4$

$$m\angle 1 = \frac{1}{2}(mRU + mST)$$

$$m\angle 2 = \frac{1}{2}(mRS + mTU)$$

Theorem 4:
The measure of an angle formed by a tangent and a chord drawn to the point of tangency (a tangent and a secant) is one-half the measure of the intercepted arc.

Example 5:

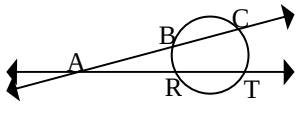


$$m\angle TCA = \frac{1}{2}mCA$$

Theorem 5:
If two secants, a secant and a tangent, or two tangents intersect in the exterior of a circle, then the measure of the angle formed is one-half the positive difference of the measures of the intercepted arcs.

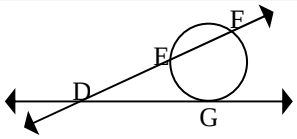
Example 6:

There are three possible cases:



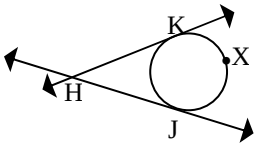
Two Secants

$$m\angle CAT = \frac{1}{2}(mCT - mBR)$$



A Secant and a Tangent

$$m\angle FDG = \frac{1}{2}(mFG - mEG)$$



Two Tangents

$$m\angle KHJ = \frac{1}{2}(mKXJ - mKJ)$$

In Summary:

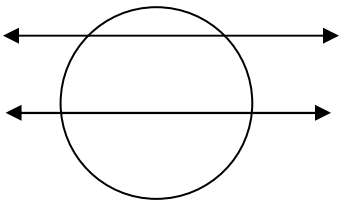
If the lines intersect **ON** the circle use: angle = $\frac{1}{2}$(arc)

If the lines intersect **IN** the circle use: angle = $\frac{1}{2}$(arc + arc)

If the lines intersect **OUT** of the circle use: angle = $\frac{1}{2}$(big arc – little arc)

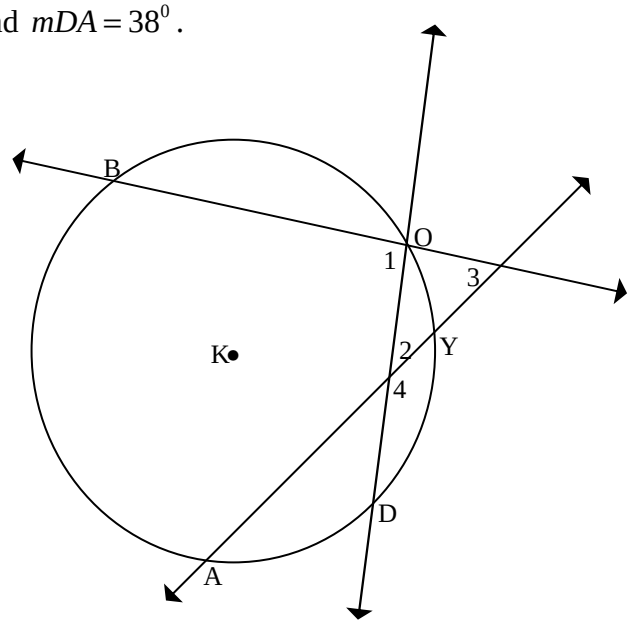
Theorem 6:
If two parallel lines intersect a circle, the intercepted arcs between those lines are congruent.

Example 7:



Example 8:

In circle K, $mOB = 98^0$, $mOY = 28^0$, $mYD = 62^0$, and $mDA = 38^0$.
Find each measure.



a) mAB

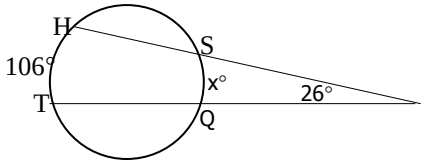
b) $m\angle 1$

c) $m\angle 2$

d) $m\angle 3$

e) $m\angle 4$

Example 9: Find the value of "x".



Example 10: Refer to the circle below, find:

a) x

b) $m\angle AET$